



## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: J.G. BEDNORZ ET AL. : Date: March 29, 1988  
 Filed: 05/22/87 : Serial No.: 06/053,307  
 Group Art Unit: 115 : Examiner: Dennis Albrecht.  
 FOR: NEW SUPERCONDUCTIVE COMPOUNDS HAVING HIGH TRANSITION TEMPERATURE,  
 AND METHODS FOR THEIR USE AND PREPARATION

DECLARATION OF SUNG IL PARK  
WITH RESPECT TO HIGH  $T_c$  SUPERCONDUCTIVITY

Commissioner of Patents and Trademarks  
 Washington, D.C. 20231

Sir:

I, Sung Il Park, hereby declare and say that:

1. I received a PhD in Applied Physics from Stanford University in October, 1986. I joined the Thomas J. Watson Research Center of IBM Corporation in Yorktown, N.Y. on approximately October 20, 1986, and began work as a Post-doctoral employee. My initial assignment was in the areas of Thin Film Interfaces and high  $T_c$  superconductivity. Almost from the beginning of my employment by IBM Corporation I worked exclusively on high  $T_c$  superconductivity and reported to Chang C. Tsuei. I am presently working in the same capacity for Chang C. Tsuei, one hundred percent of my time being spent on high  $T_c$  superconductivity.

2. I was told by Chang C. Tsuei that superconducting samples had been received by Richard Greene, the samples having been brought from IBM Corporation's Research Lab in Zurich, Switzerland. These were said to be Ba-La-Cu-Oxides that had been fabricated by Georg Bednorz and Alex Mueller in Zurich, Switzerland and transported to the U.S. by Praveen Chaudhari. Soon after I began working for Chang C. Tsuei, he asked me to prepare two of these samples for measurements of resistivity versus temperature. To do so, I and Greene cut pieces from these samples to be used for the measurements. I then pressed indium dots into these cut samples to provide electrical contacts. I attached copper wires

YO987-074

to the indium dots in order to allow connections to a current source and to voltage-measuring equipment. The individual copper wires were given number designations to allow them to be properly attached to the equipment used for the current and voltage measurements. This numbering system is represented by the two figures appearing in Chang C. Tsuei's laboratory notebook, a true copy of two pages of which are attached hereto and labeled Exhibit A.

3. In order to determine resistivity versus temperature, measurements were made of the current flowing through the Ba-La-Cu-Oxide sample while the voltage across two of the copper leads was measured. Both positive and negative polarity currents were used in order to avoid thermal effects that sometimes occur when making DC measurements. The superconducting sample was located on the end of a long probe and placed in a dewar containing liquid helium. The temperature was varied by using a heater placed near the sample. Data of current and voltage were taken from 4.2K to 50K. A germanium thermometer near the sample was used to measure the sample temperature. Since resistance is proportional to voltage, the voltage and current measurements allowed the resistance (and therefore the resistivity for a sample of known dimensions) to be measured as a function of temperature. I worked with Chang C. Tsuei to take these measurements and used a xy recorder to provide graphical plots of resistivity versus temperature for the temperature range 50K-4.2K for at least two of these Ba-La-Cu-Oxide samples.

4. The preparation and measurement of the aforementioned superconducting samples occurred at a date prior to November 15, 1986, and to the best of my recollection occurred on or about November 9, 1986, the date when a helium dewar was pumped down preparatory to taking the actual measurements. I believe that while I was assisting Chang C. Tsuei and working under his direction, Bradford Orr observed our data and graphical plots, and we told him the nature of the superconducting samples and the types of measurements that we were making.

5. My recollection of the dates when the preparation and measurement of these samples occurred is vivid to me. My first week of employment under Chang C. Tsuei was spent looking for an apartment and, upon beginning laboratory work the following week (about October 28, 1986), I was instructed by Chang C. Tsuei to immediately measure the

aforementioned samples. I cut pieces from these samples using a fine wire cutter following the direction of Richard Greene. This was done on or about October 28, 1986. After this I contacted the samples with indium as described above. This technique was very familiar to me as I had used indium contacts many times at Stanford University.

6. Both Chang C. Tsuei and I were enthused about our measurement results, as the data showed a superconducting onset temperature of about 35K followed by a drop to zero DC resistivity. We noted that the transition to zero resistivity was fairly wide, which we expected to be the case for samples that may have been unperfected and not of a single phase. In fact, the question of whether multiple phases were present in the material was something that was noted by Tsuei in the aforementioned laboratory notebook, identified as Exhibit A, attached hereto.

7. At this time, I have been unable to locate the actual data and graphical plots of resistivity versus temperature described hereinabove. I believe that this data may have been misplaced or inadvertently thrown out during an extensive cleaning of the laboratory. However, my memory of the events preparing the samples for measurements, performing the measurements and recording the data, and the results indicated by that data, are very clear in my mind.

8. All of the acts described in paragraphs 1 - 7 above occurred in the United States.

9. I further declare that all statements made hereinabove are of my own knowledge and are true and that all statements made on information and belief are believed by me to be true. Further, I declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of a Patent Application or any patent issuing thereon.



SUNG IL PARK

DATE: 3/30/88

YO987-074